

IN THE CLAIMS

Please amend the claims as follows:

Claim 1 (Currently Amended): A semiconductor device having a semiconductor layer, comprising:

a first impurity atom having a covalent bond radius larger than a minimum radius of a covalent bond of a semiconductor constituent atom of the semiconductor layer; and

a second impurity atom having a covalent bond radius smaller than a maximum radius of the covalent bond of the semiconductor constituent atom,[[;]]

~~wherein the first and second impurity atom atoms are~~ arranged in a nearest neighbor lattice site location for the first impurity atom; [[and]]

wherein at least one of the first and second impurity atoms is electrically active.

Claim 2 (Original): The semiconductor device of claim 1, wherein at least one of the first and second impurity atoms is an acceptor or a donor for the semiconductor layer.

Claim 3 (Original): The semiconductor device of claim 1, wherein a doping concentration of one of the first and second impurity atoms is equal to or larger than an electrically active impurity concentration specific to the one of the first and second impurity atoms.

Claim 4 (Currently Amended): [[The]] A semiconductor device of claim 1, having a semiconductor layer, comprising:

a first impurity atom having a covalent bond radius larger than a minimum radius of a covalent bond of a semiconductor constituent atom of the semiconductor layer; and

a second impurity atom having a covalent bond radius smaller than a maximum radius of the covalent bond of the semiconductor constituent atom;

wherein the first and second impurity atoms are arranged in a nearest neighbor lattice site location, at least one of the first and second impurity atoms being electrically active, and
~~wherein~~ one of the first and second impurity atoms produces a deep impurity level near a middle of a band gap of the semiconductor layer when a pair of the one of the first and second impurity atoms are arranged in a nearest neighbor lattice site location.

Claim 5 (Original): The semiconductor device of claim 1, wherein the semiconductor layer is a Si layer, and the first and second impurity atoms are indium and boron.

Claim 6 (Original): The semiconductor device of claim 1, wherein the semiconductor layer is a Si layer, and the first and second impurity atoms are indium and carbon.

Claim 7 (Original): The semiconductor device of claim 2, wherein a doping concentration of one of the first and second impurity atoms is equal to or larger than an electrically active impurity concentration specific to the one of the first and second impurity atoms.

Claim 8 (Currently Amended): ~~[[The]]~~ A semiconductor device of claim 2, having a semiconductor layer, comprising:

a first impurity atom having a covalent bond radius larger than a minimum radius of a covalent bond of a semiconductor constituent atom of the semiconductor layer; and

a second impurity atom having a covalent bond radius smaller than a maximum radius of the covalent bond of the semiconductor constituent atom;

wherein the first and second impurity atoms are arranged in a nearest neighbor lattice site location, at least one of the first and second impurity atoms being electrically active to be an acceptor or a donor for the semiconductor layer, and wherein one of the first and second impurity atoms produces a deep impurity level near a middle of a band gap of the semiconductor layer when a pair of the one of the first and second impurity atoms are arranged in a nearest neighbor lattice site location.

Claim 9 (Original): The semiconductor device of claim 2, wherein the semiconductor layer is a Si layer, and the first and second impurity atoms are indium and boron.

Claim 10 (Original): The semiconductor device of claim 2, wherein the semiconductor layer is a Si layer, and the first and second impurity atoms are indium and carbon.

Claim 11 (Currently Amended): ~~[[The]]~~ A semiconductor device of claim 3 having a semiconductor layer, comprising:

a first impurity atom having a covalent bond radius larger than a minimum radius of a covalent bond of a semiconductor constituent atom of the semiconductor layer; and

a second impurity atom having a covalent bond radius smaller than a maximum radius of the covalent bond of the semiconductor constituent atom;

wherein the first and second impurity atoms are arranged in a nearest neighbor lattice site location, at least one of the first and second impurity atoms being electrically active, a doping concentration of the one of the first and second impurity atoms being equal to or larger than an electrically active impurity concentration specific to the one of the first and second impurity atoms, and wherein one of the first and second impurity atoms produces a

deep impurity level near a middle of a band gap of the semiconductor layer when a pair of the one of the first and second impurity atoms are arranged in a nearest neighbor lattice site location.

Claim 12 (Original): The semiconductor device of claim 3, wherein the semiconductor layer is a Si layer, and the first and second impurity atoms are indium and boron.

Claim 13 (Original): The semiconductor device of claim 3, wherein the semiconductor layer is a Si layer, and the first and second impurity atoms are indium and carbon.

Claim 14 (Withdrawn): A manufacturing method of a semiconductor device, comprising:

providing a semiconductor substrate;

doping a first impurity atom having a covalent bond radius larger than a minimum radius of a covalent bond of a semiconductor constituent atom of a semiconductor layer of the semiconductor substrate; and

doping a second impurity atom having a covalent bond radius smaller than a maximum radius of a covalent bond of the semiconductor constituent atom so as to be arranged in a nearest neighbor lattice site of the first impurity atom.

Claim 15 (Withdrawn): The manufacturing method of claim 14, wherein at least one of the first and second impurity atoms is an acceptor or a donor for the semiconductor layer.

Claim 16 (Withdrawn): The manufacturing method of claim 14, wherein a doping concentration of one of the first and second impurity atoms is equal to or larger than an electrically active impurity concentration specific to the one of the first and second impurity atoms.

Claim 17 (Withdrawn): The manufacturing method of claim 14, wherein the first and second impurity atoms are doped into the semiconductor layer by using an ion implantation.

Claim 18 (Withdrawn): The manufacturing method of claim 15, wherein a doping concentration of one of the first and second impurity atoms is equal to or larger than an electrically active impurity concentration specific to the one of the first and second impurity atoms.

Claim 19 (Withdrawn): The manufacturing method of claim 15, wherein the first and second impurity atoms are doped into the semiconductor layer by ion implantation.

Claim 20 (Withdrawn): The manufacturing method of claim 16, wherein the first and second impurity atoms are doped into the semiconductor layer by ion implantation.

Claim 21 (New): The semiconductor device of claim 4, wherein the semiconductor layer is a Si layer, and the first and second impurity atoms are indium and boron.

Claim 22 (New): The semiconductor device of claim 4, wherein the semiconductor layer is a Si layer, and the first and second impurity atoms are indium and carbon.

Claim 23 (New): The semiconductor device of claim 8, wherein a doping concentration of one of the first and second impurity atoms is equal to or larger than an electrically active impurity concentration specific to the one of the first and second impurity atoms.

Claim 24 (New): The semiconductor device of claim 8, wherein the semiconductor layer is a Si layer, and the first and second impurity atoms are indium and boron.

Claim 25 (New): The semiconductor device of claim 8, wherein the semiconductor layer is a Si layer, and the first and second impurity atoms are indium and carbon.

Claim 26 (New): The semiconductor device of claim 11, wherein the semiconductor layer is a Si layer, and the first and second impurity atoms are indium and boron.

Claim 27 (New): The semiconductor device of claim 11, wherein the semiconductor layer is a Si layer, and the first and second impurity atoms are indium and carbon.

Claim 28 (New): The semiconductor device of claim 1, wherein doping concentrations of the first and second impurity atoms are approximately the same.